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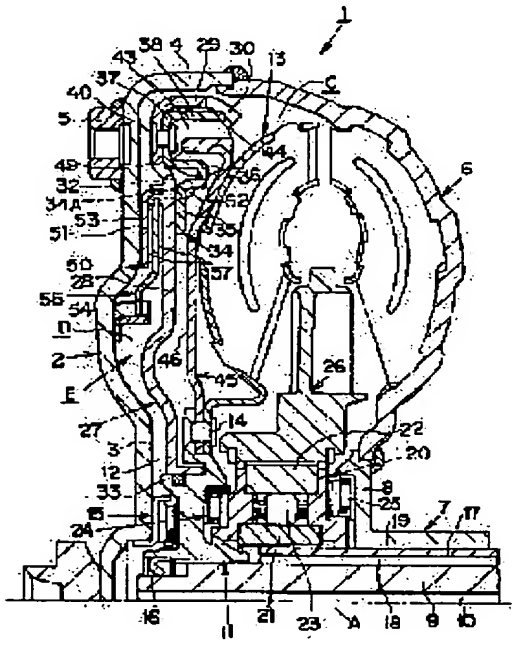
(54) LOCK-UP CLUTCH STRUCTURE

(57)Abstract:
PROBLEM TO BE SOLVED: To increase degrees of freedom on design of a connection mechanism which connects a travel member with a clutch member so as to simplify a structure of a lock up clutch by arranging the connection mechanism which connects the travel member which is moved in the direction of axial line by internal fluid pressure of an input member with a friction member which is engaged and opened by the input member in an engaging fluid chamber.
SOLUTION: A torque converter 1 controls in such a manner that oil pressure of an engaging fluid pressure chamber C is increased to be higher than oil pressure of a release fluid pressure chamber D in a torque transmission region, and a piston 27 as a travel member of a lock up clutch B moves to the left to engage a friction member 57 with the piston 27. Moreover, a second plate 55 is moved in the same direction to engage the friction member 57 with a first plate 50. Next, the first plate 50 is moved to a housing 2 side, and a friction member 53 is engaged with a housing 2. In this case, a fitting claw 52 and a fitting hole 32 as a connection mechanism which connects the piston 27, the first plate 50, and the friction member 53 mutually in such a manner that they can travel relatively are arranged in an engaging fluid chamber C to ensure fluid-tightness.



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* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] The input member of the hollow by which a rotation drive is carried out, and the output member with which it is arranged inside this input member and which the torque of said input member is delivered through a fluid, The migration member which is attached in the direction of an axis movable to this output member, and is moved in said direction of an axis by the hydrostatic pressure inside said input member, The friction member which is attached in this migration member, and is engaged for which and released by said input member, The linkage which connects this friction member and said migration member in said direction of an axis possible [relative displacement], The engagement hydrostatic pressure room which generates the hydrostatic pressure with which it is formed in the interior of said input member, and move said migration member, and said friction member and said input member are made to engage, In the lock-up clutch structure equipped with the release hydrostatic pressure room which generates the hydrostatic pressure which it is formed [hydrostatic pressure] in the interior of said input member, and moves said migration member, and makes said friction member release from said input member Lock-up clutch structure characterized by arranging said linkage at said engagement hydrostatic pressure room.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the lock-up clutch structure applied to the fluid type transmission of an automatic transmission.
[0002]
[Description of the Prior Art] The torque converter as a fluid type transmission of an automatic transmission is a fluid machinery which is arranged between an engine and a change gear style and transmits torque. Since this torque converter is transmitting torque with the fluid, a rotation difference occurs in an input member and an output member, and the transfer loss of torque generates it. Then, in the torque-transmission field which does not need the function of a torque converter, the lock-up clutch structure of raising the transmission efficiency of torque by the so-called lock-up function is adopted.
[0003] An example of such lock-up clutch structure is indicated by JP,7-4497,A.
[0004] The lock-up clutch structure indicated by this official report is equipped with the friction member which makes the torsion absorber which connects the pump impeller fixed to converter housing, the clutch hub arranged inside converter housing, the turbine runner fixed to the periphery of a clutch hub, the annular piston attached in the clutch hub movable in the direction of an axis, a piston, and a turbine runner, and a piston and converter housing engage and release.
[0005] This friction member is equipped with the annular 1st friction member attached in covering, and the annular 2nd friction member attached in the piston. And spline fitting of the periphery of the 1st friction member is carried out to the 1st body of converter housing, and spline fitting of the inner circumference of the 2nd friction member is carried out to the 2nd body of a piston. Furthermore, the release hydrostatic pressure room and the engagement hydrostatic pressure room are formed in the interior of converter housing and a pump impeller.
[0006] And when the oil pressure of a release hydrostatic pressure room and an engagement hydrostatic pressure room is controlled almost identically, the lock-up clutch is released. For this reason, the torque of converter housing is transmitted to a turbine runner by the flow of an internal oil, and this torque is transmitted to a clutch hub. On the other hand, when the oil pressure of an engagement hydrostatic pressure room is controlled more highly than the oil pressure of a release hydrostatic pressure room, a piston moves in the direction of an axis and a lock-up clutch is engaged.
[0007]
[Problem(s) to be Solved by the Invention] By the way, it is desirable to attain reduction of the components mark of a lock-up clutch and simplification of structure from the transfer loss of torque or a viewpoint of lightweight-izing of a car. For example, while carrying out penetration formation of the hole of the direction of an axis at a piston and forming the pin of the direction of an axis in the 2nd friction member, it is possible to adopt the linkage which inserts a pin in a hole and makes a piston and the 2nd friction member movable in the direction of an axis.
[0008] However, in the lock-up clutch structure indicated by the above-mentioned official report, since the linkage of a piston and the 2nd friction member is arranged at the release hydrostatic pressure room, if the above configurations are adopted, an engagement hydrostatic pressure room and a release hydrostatic pressure room will be open for free passage with a hole. Consequently, the oil pressure control of an engagement hydrostatic pressure room and a release hydrostatic pressure room becomes impossible, and the function of a lock-up clutch is spoiled. Therefore, it was difficult to attain reduction of the components mark of the linkage of the 2nd friction member, and simplification of structure by the above configurations.

[0009] This invention was made against the background of the above-mentioned situation, and aims at offering the possible lock-up clutch structure of attaining reduction of components mark, and simplification of structure by expanding the degree of freedom on the design of the linkage which connects a migration member and a clutch member.
[0010]
[Means for Solving the Problem and its Function] The input member of the hollow by which the rotation drive of this invention is carried out in order to attain the above-mentioned purpose, The output member with which it is arranged inside this input member and which the torque of said input member is delivered through a fluid, The migration member which is attached in the direction of an axis movable to this output member, and is moved in said direction of an axis by the hydrostatic pressure inside said input member, The friction member which is attached in this migration member, and is engaged for which and released by said input member, The linkage which connects this friction member and said migration member in said direction of an axis possible [relative displacement], The engagement hydrostatic pressure room which generates the hydrostatic pressure with which it is formed in the interior of said input member, and move said migration member, and said friction member and said input member are made to engage, In the lock-up clutch structure equipped with the release hydrostatic pressure room which generates the hydrostatic pressure which it is formed [hydrostatic pressure] in the interior of said input member, and moves said migration member, and makes said friction member release from said input member, it is characterized by arranging said linkage at said engagement hydrostatic pressure room.
[0011] Even when the linkage which forms the through tube of the direction of an axis in a migration member, and connects a friction member and a migration member in the direction of an axis possible [relative displacement] is constituted since the linkage which connects a migration member and a friction member is arranged at the engagement fluid room according to this invention for example, the fluid-tight nature of an engagement hydrostatic pressure room and a release hydrostatic pressure room is maintained. Therefore, it becomes possible to expand the design degree of freedom of a linkage and to attain reduction of the components mark of a linkage, and simplification of structure.
[0012]
[Embodiment of the Invention] Below, this invention is explained based on the example applied to the torque converter as a fluid type transmission of an automatic transmission. Drawing 1 is the transverse-plane half section Fig. of a torque converter 1. The torque converter 1 is formed between the engine (not shown) and the change gear style (not shown), and is equipped with a configuration which is described below.
[0013] First, the converter housing 2 has the disk section 3 and the body 4 projected in the direction of axis A towards the change gear style side, i.e., the right-hand side of drawing 1 , from the periphery edge of the disk section 3, and the multiple anchorage of the nut 5 is carried out to the lateral surface of the disk section 3 along with the circumferencial direction. And the bolt (not shown) attached in an engine flywheel (not shown) is thrust into a nut 5, and a flywheel and the converter housing 2 are connected.
[0014] The annular pump impeller 6 which rotates Axis A as a core on the right-hand side of drawing 1 the change gear style side of the converter housing 2 that is, is formed, and welding immobilization of the periphery edge is carried out at the point of the body 4 of the converter housing 2. Moreover, welding immobilization of the inner circumference edge of the pump impeller 6 is carried out at the periphery edge of the outward flange 8 of the connecting drum 7. In addition, the connecting drum 7 is supported pivotable by the bearing (not shown) prepared in housing (not shown) of an automatic transmission.
[0015] On the other hand, in the connecting drum 7, the output shaft 9 is arranged pivotable considering Axis A as a core, and the edge of one of these has reached to near the converter housing 2. In the output shaft 9, the oilway 10 is formed along with Axis A, and this oilway 10 is connected to the lock-up control bulb (not shown).
[0016] Moreover, spline fitting of the annular clutch hub 11 is carried out to the edge outside periphery by the side of the converter housing 2 in an output shaft 9, and the outward flange 12 is formed in the periphery of the clutch hub 11. The annular turbine runner 13 is being fixed to the side face by the side of the pump impeller 6 of an outward flange 12 with the rivet 14. And thrust bearing 15 is formed between the outward flange 12 and the medial surface of the converter housing 2. in addition -- the edge by the side of the converter housing 2 in an output shaft 9 -- between the periphery of an output shaft 9, and the inner circumference of the clutch hub 11 -- liquid -- it is equipped with the oil seal 16 maintained densely.
[0017] The fixed cylinder 17 is formed between said connecting drums 7 and output shafts 9, and the fixed

cylinder 17 is supported by rotation impossible with housing of an automatic transmission. The edge of the fixed cylinder 17 has reached to near the clutch hub 11, the bore of the fixed cylinder 17 is set up more greatly than the outer diameter of an output shaft 9, and the outer diameter of the fixed cylinder 17 is set up smaller than the bore of the connecting drum 7. Thus, between the inner skin of the fixed cylinder 17, and an output shaft 9, the oilway 18 which is open for free passage on a control bulb (not shown) is formed, and the oilway 19 which is open for free passage to an oil pump (not shown) is formed between the fixed cylinder 17 and the connecting drum 7.

[0018] The one way clutch 20 is attached between the connecting drums 7 and the clutch hubs 11 in the periphery of the fixed cylinder 17. An one way clutch 20 is the thing of the well-known structure which consisted of engagement objects 23 established between the inner ring of spiral wound gasket 21 by which spline fitting was carried out to the fixed cylinder 17, the outer ring of spiral wound gasket 22 arranged around an inner ring of spiral wound gasket 21, and an inner ring of spiral wound gasket 21 and an outer ring of spiral wound gasket 22.

[0019] And while thrust bearing 24 is formed between the one way clutch 20 and the clutch hub 11, thrust bearing 25 is formed between the one way clutch 20 and the outward flange 8 of the connecting drum 7. Thus, the clutch hub 11 and the one way clutch 20 are positioned in the direction of axis A to the converter housing 2 and the connecting drum 7. In addition, the annular stator 26 is being fixed to the periphery of an outer ring of spiral wound gasket 22.

[0020] The lock-up clutch B is formed in the interior of the torque converter 1 constituted as mentioned above between the converter housing 2 and the turbine runner 13. Hereafter, the configuration of the lock-up clutch B is explained concretely.

[0021] The annular piston 27 is attached in the periphery of said clutch hub 11. this piston 27 -- the clutch hub 11 -- receiving -- relativity -- it is constituted possible [relative displacement] in the direction of axis A pivotable. A piston 27 has the disk section 28 prepared in radial, and the body 29 projected in the direction of axis A towards the pump impeller 6 side from the periphery edge of the disk section 28.

[0022] Drawing 2 is the right side view of a piston 27, and two or more formation of the notch 30 is carried out every predetermined spacing at the body 29 at the circumferencial direction. And the rivet hole 31 is respectively formed in the location corresponding to the notch 30 by the side of the periphery of the disk section 28. Each rivet hole 31 is mostly arranged on the same periphery. Moreover, rather than the rivet hole 31 in the disk section 28, predetermined spacing is set to a circumferencial direction and two or more formation of the fitting hole 32 is carried out at the inner circumference side. in addition, between said clutch hubs 11 and pistons 27, as shown in drawing 1 , O ring 33 equips -- having -- between the clutch hub 11 and pistons 27 -- liquid -- the seal is carried out densely.

[0023] Two or more spring maintenance plates 34 are attached in the side face by the side of the turbine runner 13 of a piston 27 at the circumferencial direction. Drawing 3 is the right side view of a piston 27 and the spring maintenance plate 34. The substrate section 35 of the shape of radii by which the spring maintenance plate 34 was contacted by the side face of the disk section 28 of a piston 27, The flection 36 of the pair crooked in the shape of U character so that it might project from the both ends of the substrate section 35 at the turbine runner 13 side and might return to a piston 27 side, It has the guide section 39 which was formed between the tabular fixed part 37 connected towards the outside from the flection 36 of a pair, the claw part 38 projected from the outer edge of each fixed part 37 at the pump impeller 6 side, and the flection 36 of the pair of the substrate section 35, and was projected at the turbine runner 13 side.

[0024] And the fixed part 37 and the piston 27 are being fixed with the rivet 40 inserted in the rivet hole 31 of a piston 27. Thus, it is arranged in the location which flection 36 comrades of the spring maintenance plate 34 which adjoins a circumferencial direction, fixed part 37 comrades, and claw part 38 comrades approached. In addition. In the periphery of each spring maintenance plate 34, notch 34A is formed in the location corresponding to the fitting hole 32 of a piston 27, respectively.

[0025] Moreover, between the guide section 39 of each spring maintenance plate 34, and the body 29 of a piston 27, two or more 1st coil springs 41 are arranged at a circumferencial direction, and the 2nd coil spring 42 set as the appearance smaller than the bore of the 1st coil spring 41 is arranged among each 1st coil spring 41 in way space. The die length of the circumferencial direction of this 2nd coil spring 42 is set up shorter than the die length of the circumferencial direction of the 1st coil spring 41.

[0026] Furthermore, the both ends of each 1st coil spring 41 are held with the retaining pin 43, and each retaining pin 43 is contacted by the flection 36 and the claw part 39. Moreover, the auxiliary maintenance

plate 44 is respectively arranged between notch 30 comrades at the inner circumference of the body 29 of a piston 27. Each auxiliary maintenance plate 44 is equipped with the configuration which curved in the shape of radii in the direction of axis A as it had the configuration which curved to the circumferencial direction as shown in drawing 4 , and shown in drawing 1 . And each 1st coil spring 41 and the 2nd coil spring 42 are held at the inner circumference side of each auxiliary maintenance plate 44.

[0027] In addition, as the tip of the body 30 of a piston 27 shows drawing 1 , it is crooked inside, and it is certainly held by a part for this flection, and the guide section 39 so that there may be that no the auxiliary maintenance plate 44, the 1st coil spring 41, and the 2nd coil spring 42 drop [de]. Thus, the 1st coil spring 41 and the 2nd coil spring 42 are held possible [telescopic motion] in the field of flection 36 comrades and claw part 39 comrades at the circumferencial direction.

[0028] The damper style is constituted by the 1st coil spring 41 of the above, the 2nd coil spring 42, the retaining pin 43, etc. This damper style is for controlling that the impact produced at the time of fluctuation of engine power and engagement of the lock-up clutch B is transmitted to an output shaft 9.

[0029] On the other hand, the torque-transmission ring 45 is attached between the outward flange 12 of said clutch hub 11, and the inner circumference edge of the turbine runner 13. This torque-transmission ring 45 is for transmitting the torque transmitted from a piston 27, the 1st coil spring 41, and the 2nd coil spring 42 to the clutch hub 11.

[0030] Drawing 4 is the right side view of the torque-transmission ring 45, and the rivet hole 47 penetrated in the direction of axis A is formed in the inner circumference side of the disk section 46 of the torque-transmission ring 45. Two or more formation of this rivet hole 47 is carried out on the same periphery, and the clutch hub 11, the turbine runner 13, and the torque-transmission ring 45 are being fixed with the rivet 14 inserted in each rivet hole 47.

[0031] Moreover, two or more through tubes 48 are formed on the same periphery rather than the rivet hole 47 of the disk section 46 at the periphery side. Furthermore, the periphery side of the disk section 45 inclines a little in the turbine runner 13 side, and two or more pressure receiving sections 49 are formed in the periphery edge. Each pressure receiving section 49 is formed in the location corresponding to the notch 30 of a piston 27.

[0032] Each pressure receiving section 49 is crooked towards a rivet 40 side from the periphery of the disk section 46, as shown in drawing 1 , and it is crooked to hard flow from the part which reaches mostly focusing on arrangement of the 1st coil spring 41 and the 2nd coil spring 42, and reinforcement is raised. Thus, between the flection 36 of the spring maintenance plate 34, and the claw part 38, if each pressure receiving section 49 puts in another way, it is arranged between retaining pin 43 comrades.

[0033] On the other hand, as shown in drawing 1 , between said pistons 27 and disk sections 3 of the converter housing 2, the 1st annular plate 50 is arranged focusing on Axis A. Drawing 5 is the side elevation of the 1st plate 50, and the 1st plate 50 equips the periphery of the disk section 51 and the disk section 51 with the fitting pawl 52 by which two or more formation was carried out at intervals of predetermined at the circumferencial direction.

[0034] Each fitting pawl 52 is formed corresponding to the fitting hole 32 of a piston 27, it projects in the direction of axis A from the periphery of the disk section 51 at the pump impeller 6 side, subsequently to hard flow, it is turned up from it, and reinforcement is raised. And each fitting pawl 52 is inserted in the fitting hole 32 and notch 34A, and the 1st plate 50 and a piston 27 have really rotated composition. Moreover, the 1st plate 50 and a piston 27 can be displaced relatively in the direction of axis A. In addition, the annular clutch facing 53 is being fixed to the opposed face with the disk section 3 in the disk section 51.

[0035] The body 54 is being fixed to the medial surface of said disk section 3 focusing on Axis A, and the outer diameter of this body 54 is set up smaller than the bore of the 1st plate 50. And spline fitting of the 2nd annular plate 55 is carried out to the periphery of a body 54. The outer diameter of this 2nd plate 55 is set up smaller than the bore of the fitting pawl 52 of the 1st plate 50, and the 2nd plate 55 is arranged between the 1st plate 50 and a piston 27.

[0036] Drawing 6 is the right side view of the 2nd plate 55, and two or more notching 56 is formed in the inner circumference side of the 2nd plate 55 at the circumferencial direction. This notching 56 engages with the external tooth of a body 54. And the annular clutch facing 57 is being fixed to the both-sides side of the 2nd plate 55. The outer diameter of clutch facing 57 is set up almost equally to the outer diameter of clutch facing 53, and the bore of clutch facing 57 is set up almost equally to the bore of clutch facing 53.

[0037] Clutch facing 53 and 57 is arranged focusing on Axis A, and as shown in drawing 2 , the outer

diameter of clutch facing 53 and 57 is set up smaller than the diameter of the inscribed circle (not shown) of each fitting hole 32 of a piston 27. Therefore, clutch FESHINNGU 57 engages with an inner circumference side rather than each fitting hole 32 of a piston 27.

[0038] In the above-mentioned configuration, if the lock-up clutch B is engaged as shown in drawing 1 , the interior of the converter housing 2 and the pump impeller 6 will be divided by the clutch hub 11, a piston 27, the 1st plate 50, clutch facing 53, the 2nd plate 55, and clutch facing 57, and the engagement hydrostatic pressure room C and the release hydrostatic pressure room D will be formed. And said oilway 10 is opened for free passage by the release hydrostatic pressure room D, and said oilways 18 and 19 are opened for free passage by the engagement hydrostatic pressure room C.

[0039] Moreover, in the above-mentioned example, the fitting pawl 52 for connecting a piston 27 and the 1st plate 50 in the direction of axis A possible [relative displacement] and the fitting hole 32 have been arranged at the periphery side of clutch facing 53 and 57, and have met the engagement hydrostatic pressure room C. Furthermore, notch 34A to which fitting of the fitting pawl 52 is carried out has also met the engagement fluid room C.

[0040] Here, if the correspondence relation between the configuration of the above-mentioned example and claim 1 is explained, the converter housing 2 and the pump impeller 6 are equivalent to the input member of claim 1, the clutch hub 11 and an output shaft 9 are equivalent to the output member of claim 1, a piston 27 is equivalent to the migration member of claim 1, the 1st plate 50 and clutch facing 53 are equivalent to the friction member of claim 1, and the fitting pawl 52 and the fitting hole 32 are equivalent to the linkage of claim 1.

[0041] Below, actuation of the above-mentioned example is explained. First, the oil is supplied to the interior of a torque converter 1 through the oilway 19 from the oil pump which is not illustrated, and if rotation of an engine is transmitted to the pump impeller 6 from the converter housing 2, flow will occur to oil in a torque converter 1 by rotation of the pump impeller 6.

[0042] Then, the turbine runner 13 makes torque by the flow of an oil, and the made torque is transmitted to a change gear style through the clutch hub 11 and an output shaft 9. Working [this] and a stator 26 change the flow of an oil, and serve to make the torque transmitted to the turbine runner 13 from the pump impeller 6 amplify.

[0043] In the torque-transmission field which needs the function of a torque converter 1, the oil pressure of the engagement hydrostatic pressure room C and the release hydrostatic pressure room D is controlled by oil pressure supplied through oilways 10 and 18 from a control bulb almost equally during transfer of the above-mentioned torque, and the lock-up clutch B is released.

[0044] On the other hand, in the torque-transmission field where the function of a torque converter 1 is unnecessary, control which raises the oil pressure of the engagement hydrostatic pressure room C rather than the oil pressure of the release hydrostatic pressure room D is performed. Then, while a piston 27 moves in the direction of axis A towards the converter housing 2 side and the friction member 57 and a piston 27 are engaged, the 2nd plate 55 is moved to the converter housing 2 side, and clutch facing 57 and the 1st plate 50 are engaged. Subsequently, the 1st plate 50 is moved to the converter housing 2 side, and clutch facing 53 engages with the converter housing 2.

[0045] Thus, if the lock-up clutch B is engaged, the torque of the converter housing 2 will be transmitted to the 1st coil spring 41 and the 2nd coil spring 42 through a piston 27 and the spring maintenance plate 34, elastic deformation of the 1st coil spring 41 and the 2nd coil spring 42 will be carried out, and an impact will be absorbed. The torque transmitted to the 1st coil spring 41 and the 2nd coil spring 42 is transmitted to an output shaft 9 through a retaining pin 43, the torque-transmission plate 45, and the clutch hub 11.

[0046] According to the above-mentioned example, the fitting pawl 52 and the fitting hole 32 which connect a piston 27, the 1st plate 50, and clutch facing 53 possible [relative displacement] are arranged on the outside [side / of clutch facing 57 and a piston 27 / engagement] C, i.e., an engagement fluid room. moreover, between the clutch hub 11 and pistons 27 -- O ring 33 -- liquid -- the seal is carried out densely. For this reason, in spite of forming the fitting hole 32 which penetrates a piston 27 in the direction of axis A, the fluid-tight nature of the engagement hydrostatic pressure room C and the release hydrostatic pressure room D is maintained.

[0047] Therefore, the design degree of freedom of a linkage is expanded, for example, it is not necessary to connect a piston and the 1st plate according to complicated devices, such as spline fitting, and it becomes possible to attain reduction of the components mark of a linkage, and simplification of structure.

[0048] Moreover, according to the above-mentioned example, the rivet 40 for fixing a piston 27 and the spring maintenance plate 34 is attached between 1st coil spring 41 comrades, and the exposure front face by the side of the converter housing 2 of a piston 27 is expanded outside as much as possible. Therefore, it becomes possible to set up greatly the outer diameter of the clutch facing 53 and 57 which engages with a piston 27 as much as possible, and to arrange clutch facing 53 and 57 to a periphery side as much as possible, the heat capacity and torque capacity of an engagement side of clutch facing 53 and 57 are fully secured, and a torque communicative function improves.
[0049] The transverse-plane half section Fig. and drawing 8 which show the example of others [drawing 7] are the right side view of drawing 7 . In this example, the lock-up clutch F is arranged between the turbine runner 13 and the converter housing 2. Hereafter, the configuration of the lock-up clutch F is explained to a detail. The annular piston 60 is attached in the periphery of the outward flange 12 of the clutch hub 11. this piston 60 -- an outward flange 12 -- receiving -- the direction of axis A -- relative displacement -- possible -- and relativity -- it is constituted pivotable.
[0050] A piston 60 has the disk section 61 prepared in radial, and the body 62 projected in the direction of axis A towards the pump impeller 6 side from the periphery of the disk section 61. The annular clutch facing 63 centering on Axis A is being fixed to the side face by the side of the converter housing 2 of the disk section 61.
[0051] On the other hand, the annular middle hub 64 is being fixed to the outward flange 12 of the clutch hub 10. Moreover, spline fitting of the annular torque-transmission plate 65 is carried out to the periphery of the middle hub 64. As shown in drawing 8 , every predetermined spacing, a claw part 66 projects to a circumferencial direction, and is formed in the periphery of the torque-transmission plate 65 at it. This claw part 66 is projected in the direction which intersects perpendicularly with Axis A mostly. Moreover, two or more formation of the long hole 67 penetrated in the direction of axis A on the torque-transmission plate 65 is carried out at the circumferencial direction.
[0052] Furthermore, the annular spring maintenance plate 68 is attached in the side face by the side of the turbine runner 13 of the torque-transmission plate 65. And the spring maintenance plate 68 and the piston 60 are being fixed to relative rotation impossible with the rivet 69, and the rivet 69 is inserted into the long hole 67. that is, a piston 60 and the spring maintenance plate 68, and the torque-transmission plate 65 -- a long hole 67 -- a circumferencial direction -- the fixed range -- relativity -- it is constituted pivotable.
[0053] The periphery side of the disk part contacted by the torque-transmission plate 65 inclined in the turbine runner 13 side, it was formed in the direction in which Axis A and the periphery side cross at right angles, the periphery side inclined in the turbine runner 13 side further, and said spring maintenance plate 68 is equipped with the flection 70 projected in the direction in which Axis A and the periphery side cross at right angles further. **.
[0054] Window part 70A of a circumferencial direction is formed in this flection 70, and two or more formation of the lobe 71 projected towards the piston 60 side in the periphery edge of a flection 70 is carried out every predetermined spacing at the circumferencial direction. The arrangement location of this lobe 71 is set up almost identically to the arrangement location of the claw part 66 of the torque-transmission plate 65. Each lobe 71 is arranged outside the claw part 66. Moreover, in the edge by the side of the piston 60 of each lobe 71, the lobe 72 projected inside is respectively formed in the direction which intersects perpendicularly with Axis A. Each lobe 72 is arranged between a claw part 66 and the disk section 3 of a piston 60.
[0055] On the other hand, among each [lobe 71], the auxiliary attachment component 73 is specifically arranged respectively the inner circumference side of the body 62 of a piston 60. Each auxiliary attachment component 73 curves in the shape of radii to a circumferencial direction, and the configuration of the direction of axis A is also curving in the shape of radii. And between the insides of each auxiliary attachment component 73, i.e., claw part 66 comrades, the 1st coil spring 74 is arranged respectively.
[0056] Furthermore, the 2nd coil spring 75 set as the outer diameter smaller than the bore of the 1st coil spring 74 is respectively arranged among each 1st coil spring 74 in way space. The die length of the circumferencial direction of each 1st coil spring 74 is set up for a long time than the die length of the circumferencial direction of the 2nd coil spring 75.
[0057] In this example, a piston 27 and the spring maintenance plate 68 rotate further again in the direction (clockwise rotation) of arrow-head E shown in drawing 8 . And the retaining pin 76 is respectively arranged in the part corresponding to the upstream of the hand of cut of a piston 27 so that it may be shown in the end side of each 1st coil spring 74, i.e., drawing 8 .

[0058] And the claw part 66, the lobe 72, and the flection 70 are contacted by this retaining pin 76. Moreover, as shown in the edge of the downstream of the hand of cut of the 1st coil spring 74 at drawing 7 , the claw part 66 is mostly contacted in the diameter direction. The damper style is constituted by the 2nd coil spring 75 of the above, the 1st coil spring 74 of the above, the 2nd coil spring 75, the retaining pin 76, etc. In addition, other configurations are the same as that of the example of drawing 1 thru/or drawing 6 .
[0059] Below, actuation of the example shown in drawing 7 and drawing 8 is explained. First, in the torque-transmission field which needs the function of a torque converter 1, it operates like the example of drawing 1 thru/or drawing 6 . On the other hand, in the torque-transmission field where the function of a torque converter 1 is unnecessary, the oil pressure which acts on the side face by the side of the pump impeller 6 of a piston 60 is raised, a piston 60 moves in the direction of axis A towards the converter housing 2 side, and clutch facing 63 engages with the converter housing 2. Consequently, the torque of the converter housing 2 is transmitted to the spring maintenance plate 68 through a piston 60 and a rivet 45.
[0060] Then, in order that the flection 70 of the spring maintenance plate 68 and a lobe 72 may press a retaining pin 76 to a circumferencial direction, this thrust is transmitted to a claw part 66 through the 1st coil spring 74 and the 2nd coil spring 75. Consequently, the torque-transmission plate 65 rotates and the torque is transmitted to an output shaft 9 through the middle hub 64 and the clutch hub 11.
[0061] On the other hand, during engagement of the lock-up clutch F, when fluctuation of torque occurs in an engine side, torque fluctuation is absorbed because the 1st coil spring 74 and the 2nd coil spring 75 expand and contract, and transfer of smooth torque is performed between a piston 60 and the torque-transmission plate 65.
[0062] Moreover, it is controlled as much as possible that the thrust force of the direction of axis A acts on the 1st coil spring 74 and the 2nd coil spring 75, and it is certainly expanded [since the claw part 66 is arranged at drawing 7 and drawing 8 in the diameter direction of the 1st coil spring 74 and the 2nd coil spring 75 according to the example] and contracted by the circumferencial direction. Therefore, the hysteresis torque by telescopic motion of the 1st coil spring 74 and the 2nd coil spring 75 is stabilized, and a torque communicative function is maintained good. For this reason, it becomes possible to expand the engagement field of the lock-up clutch F to a low vehicle speed side further.
[0063] Moreover, according to the example of drawing 7 and drawing 8 , Axis A, and the part and lobe 72 of a flection 70 of the spring maintenance plate 68 cross at right angles mostly, and are arranged in parallel with mutual, and the end and the maintenance pawl 76 of the 1st coil spring 74 are supported by the part and lobe 72 of this flection 70 by two points, respectively. Therefore, the holding power of the 1st coil spring 74 is fully secured, and it becomes possible to hold the 1st coil spring 74 certainly with the single spring maintenance plate 68.
[0064] Furthermore, according to the example of drawing 7 and drawing 8 , a retaining pin 76 is arranged at the upstream of the hand of cut of the 1st coil spring 74, and radial migration of the edge of the 1st coil spring 74 is regulated with the retaining pin 76. For this reason, also when the 1st coil spring 74 is expanded and contracted, it enables it to control that the periphery side of the 1st coil spring 74 contacts the auxiliary attachment component 73 as much as possible, and to control fluctuation of the hysteresis torque by telescopic motion of the 1st coil spring 74. For this reason, it becomes possible to expand the engagement field of the lock-up clutch F to a low vehicle speed side further.
[0065] Since the attachment component according to rank is not arranged at the downstream of the hand of cut of the 1st coil spring 74 according to the example of drawing 7 and drawing 8 , when large fluctuation of transfer torque arises, the periphery side of the 1st coil spring 74 is contacted by the auxiliary attachment component 73, and torque fluctuation is absorbed by the frictional resistance further again. Therefore, the storability [coil spring / 74 / 1st] by the side of the inner circumference of the auxiliary attachment component 73 improves. In addition, this invention is applicable also to Froude coupling.
[0066]
[Effect of the Invention] Even when the linkage which forms the through tube of the direction of an axis in a migration member, and connects a friction member and a migration member in the direction of an axis possible [relative displacement] is constituted since the linkage which connects a migration member and a friction member is arranged at the engagement fluid room according to this invention as explained above for example, the fluid-tight nature of an engagement hydrostatic pressure room and a release hydrostatic pressure room is maintained. Therefore, it becomes possible to expand the design degree of freedom of a linkage and to attain reduction of the components mark of a linkage, and simplification of structure.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the transverse-plane half section Fig. showing the example which applied the lock-up clutch structure of this invention to the torque converter of an automatic transmission.
[Drawing 2] It is the right side view of the piston used for the example of drawing 1 .
[Drawing 3] It is the right side view showing the piston and spring maintenance plate which are used for the example of drawing 1 , the 1st coil spring, and the 2nd coil spring.
[Drawing 4] It is the right side view showing the torque-transmission ring used for the example of drawing 1 .
[Drawing 5] It is the right side view showing the 1st plate used for the example of drawing 1 .
[Drawing 6] It is the right side view showing the 2nd plate used for the example of drawing 1 .
[Drawing 7] It is the transverse-plane half section Fig. showing other examples which applied the lock-up clutch structure of this invention to the torque converter of an automatic transmission.
[Drawing 8] It is the right side view showing the piston and spring maintenance plate which are used for the example of drawing 7 , the 1st coil spring, the 2nd coil spring, and a torque-transmission plate.
[Description of Notations]
2 Converter Housing
6 Pump Impeller
9 Output Shaft
11 Clutch Hub
27 Piston
32 Fitting Hole
50 1st Plate
52 Fitting Pawl
53 57 Clutch facing
55 2nd Plate
A Axis
B Lock-up clutch
C Engagement hydrostatic pressure room
D Release hydrostatic pressure room

[Translation done.]